DOCUMENT RESUME

ED 046 373 JC 710 024

AUTHOR	Brightman, Richard W.
TITLE	Project CALCOP. Final Report.
INSTITUTION	Coast Community Coll. District, Costa Mesa, Calif.
PUB DATE	Dec 70
NOTE	34p.
EDRS PRICE	EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS	Classroom Techniques, *Computer Assisted Instruction, *Independent Study, *Instructional Media, *Junior Colleges, *Law Enforcement
IDENTIFIERS	Calfifornia

ABSTRACT

This is the final report of project CALCOP, a joint project of the Coast Community College District, the Los Angeles Police Department, and the Los Angeles Police Academy to develop, implement, and evaluate computer-assisted instruction (CAI) in the rules of evidence and seach-and-seizure procedures of police training. The CALCOP learning system is a combination of independent study and CAI exercises. The project compared one group of cadets using the CALCOP learning system and another group with similar characteristics using conventional classroom instruction. CALCOP provided simulated case problems for cadets that reinforced learning, broadened perspectives, and provided a mock field experience. The conclusion, based on examination results, shows that a learning system that removes the cadet from the rigid discipline of the conventional academy classroom is more effective as a teaching technique than the traditional classroom. (CA)

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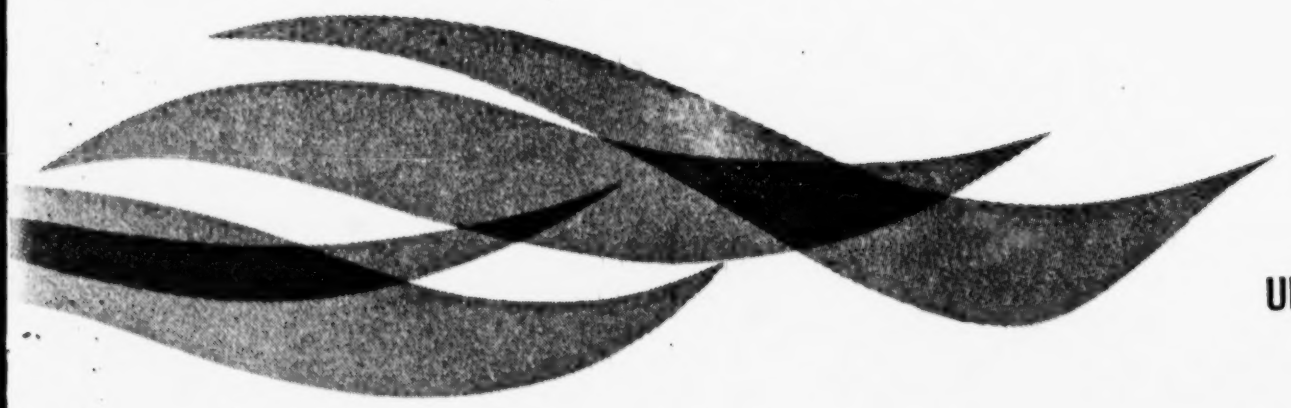

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PROJECT CALCOP
FINAL REPORT
DECEMBER, 1970

JC 710 024

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PREFACE

This report describes the activities of Project CALCOP. a joint project of the Coast Community College District, the Los Angeles Police Department, and the Los Angeles Police Academy. The project was financed in part by a grant from the Law Enforcement Assistance Administration (Institute Grant NI-066), and this paper serves as the final report of the project.

A number of individuals deserve recognition for their efforts in doing the work of the project:

Mr. Derald D. Hunt, Director of Law Enforcement Program for Golden West College, for designing and preparing the Study Syllabus and the computer simulated case problems and for scoring the final examinations.

Sergeant M. R. Ingalls, of the Los Angeles Police Academy, for designing and testing the final examination and for reviewing the Syllabus and other training materials.

Mr. Monty Ruth, of the Coast Community College District, for preparing and implementing computer programs used in the simulation exercises and in the statistical analysis.

Sergeant Diane Harber, of the Los Angeles Police Department, for coordinating the otherwise diverse efforts of the Los Angeles Police Academy and the Coast Community College District.

Miss Bonnie Borawski and Mrs. Ellen Gradick, of the Coast Community College District, for their efforts in assuring that the study materials and this report were properly produced.

I list here others whose help represent important contributions to the success of this project: Lieutenant Delbert R. Wheaton, of the Los Angeles Police Department; Officer Ray Heslop, of the Los Angeles Police Department; Mr. George Martin, of the Los Angeles Police Department; Mr. Thomas Adams, Coordinator of the Police Science Program at Santa Ana College; and Officer Roger Sobie, of the Los Angeles Police Department.

R.W.B.

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NOTE:

The tables and appendices have been omitted from this report. Further details of this program may be obtained from the author (see cover page for address).

I. PROJECT CALCOP SUMMARY

Coast Community College District and the Los Angeles Police Department have completed a joint project for the development, implementation and evaluation of computer assisted instruction techniques in a specific area of police training.

Recent months have seen considerable excitement concerning computer assisted learning as a new instructional technique. By and large, computer assisted learning, or as it is often called, computer assisted instruction (CAI), is defined as a process in which a student interacts more or less directly with a computer system in a learning situation.

PURPOSE

Project CALCOP served a two-fold purpose. First, the project sought to develop a computer assisted learning system for the purpose of training in the area of search and seizure and rules of evidence. Second, the project evaluated the effectiveness of the computer assisted learning system. In doing this, the project examined the hypothesis that the learning system designed by the project, consisting of independent study and CAI exercises, would be more effective than conventional classroom instruction.

PROCEDURES

Procedures followed in Project CALCOP, are enumerated below:

1. Objectives of training programs in search and seizure and rules of evidence were formulated.

2. An examination designed to test the degree to which the objectives were met was developed.

3. A syllabus of cognant material to be used for study purposes on an independent basis was prepared.

4. Case problems simulated through the use of the computer terminal were prepared and implemented.

5. Training was conducted using the computer assisted learning system and the syllabus at Golden West College. Training also took place through conventional classroom instruction at the Los Angeles Police Academy.

6. The examination was administered to police cadets at both the Los Angeles Police Academy and the Golden West Academy. Performance on this examination was compared between the two groups to determine if the computer assisted instruction techniques were more or less effective than conventional classroom techniques.

RESULTS

Comparison of examination performance levels on the part of the Los Angeles Police Academy cadets and the cadets at Golden West College Police Academy showed that the Golden West College group performed significantly better on each of the three parts of the examination as well as for the examination as a whole. The difference in performance levels was found to be statistically significant in each case at the .01 level of confidence.

CONCLUSIONS

Learning systems such as that developed by Project CALCOP which remove the police cadet from the rigid discipline of the academy classroom show significant promise as more effective pedagogical techniques than current methods.

II. PROCEDURES

Project CALCOP engaged in a number of activities during its execution. These include establishment of behavioral objectives to be achieved by police cadets using the learning materials developed; establishing a steering committee for the project; establishing an executive committee for the project; preparing the simulation materials; and designing, testing and executing evaluation methods. Each of these activities is discussed in the paragraphs to follow.

ESTABLISH PROJECT STEERING COMMITTEE

As outlined in the project proposal of April 10, 1969, Project CALCOP operated under the guidance of a steering committee composed of police officials, educational experts, and lay police advisors. Individuals serving on the Project CALCOP steering committee are listed below.

Inspector George Beck, Assistant Commander, Office of Special Services, Los Angeles Police Department, Chairman.

Dr. Norman E. Watson, Chancellor, Coast Community College District.

Deputy Chief Robert Gaunt, Commander, Planning and Fiscal Bureau, Los Angeles Police Department.

Inspector Vernon Hoy, Assistant Commander, Personnel and Training Bureau, Los Angeles Police Department.

Mr. Arthur Suchesk, Manager of Instructional Media and Systems, Southern California Regional Occupational Center.

Mr. John S. Owens, Vice Chancellor, Vocational Education, Coast Community College District.

Captain George Conroy, Commander, Records and Identification Division, Los Angeles Police Department.

Mr. Derald D. Hunt, Director of Law Enforcement Program, Golden West College Police Science Program.

ESTABLISH PROJECT EXECUTIVE COMMITTEE

The Project Executive Committee oversaw the work done by the project, determined goals and objectives, and reviewed the final results. The Executive Committee consists of police officers and educators as listed below.

Lieutenant Delbert R. Wheaton, Los Angeles Police Department.

Sergeant Diane Harber, Los Angeles Police Department.

Sergeant M. R. Ingalls, Los Angeles Police Department.

Mr. Derald Hunt, Director of Law Enforcement Program, Golden West College.

Mr. Richard W. Brightman, Director of Research and Planning, Coast Community College District.

ESTABLISH GENERAL AND BEHAVIORAL OBJECTIVES

The initial Project CALCOP proposal outlined broad objectives to be served by the Project. The first task of the Executive Committee, meeting during the summer of 1969, was to develop specific general and behavioral objectives of the program. These objectives are described in a later section of this report.

PREPARATION OF STUDY SYLLABUS

A syllabus was prepared outlining the factual or cognate material that Golden West police cadets should master before entering the field as operating

police officers. Preparation of this document involved the efforts of the Law Enforcement staff at Golden West College. The completed syllabus was thoroughly reviewed by the instructional staff at both Golden West College and the Los Angeles Police Academy. The review revealed several points in the syllabus that require updating and revision because of recent court decisions regarding police procedures in arrest, search and seuzire. A syllabus critique prepared by the Los Angeles Police Academy is available. Interested parties should address requests to:

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In general, use of the syllabus by Golden West College police cadets pointed out the necessity for its continual review and updating. For this reason, the syllabus as shown in this report should not be viewed as a final document ready for distribution to law enforcement students, but rather as the first of a series of progressively updated documents outlining matters of arrest, search and seizure and rules of evidence. The syllabus appears in Appendix I of this report.

PREPARATION OF SIMULATED CASE PROBLEMS

Case problems simulated through the use of computer terminals were developed for twenty-six cases reported in the Law Enforcement Legal Information Bulletin published by the Los Angeles District Attorney's office. Use of these case problems involved a two-fold process. First, police cadets would aprise themselves of the basic facts of a particular case situation. Once satisfied that they were familiar with it and with the laws surrounding

the situation as presented in the syllabus, they would approach a computer terminal, identify themselves and the particular case they wanted to work on. The computer terminal would respond by asking them questions about the case, providing them additional information, and evaluating the results of their work.

Appendix II includes all of the written descriptions of the twenty-six case problems as well as a list of all of the case problems identified by number and by the APL workspace name in which the cases could be found in the Coast Community College District computer system. Computer programming for the simulated portions of the case problems was accomplished through the use of APL programming language. Complete program documentation of each of the case problems is available from the Coast Community College District and interested parties should send requests to the address shown on the preceding page.

Appendix III shows typical computer terminal output for the execution of cases 12 and 22. For the purpose of illustrating the manner in which incorrect responses were treated by the computer, the operator answered questions incorrectly about as many times as he answered them correctly.

PREPARATION OF EVALUATION MATERIALS

In considering techniques of evaluation, the Executive Committee recognized the need to approximate, as much as possible, actual field situations that prospective peace officers are likely to encounter while on duty. Ideally, each cadet should investigate a mock field situation prepared by the educational institution and would be evaluated in terms of his performance in conducting his investigation. Clearly, this ideal evaluation

technique is impractical for most educational institutions, as it requires considerable amounts of time for each student being evaluated. A promising alternative, investigated by the Committee, involved depiction of one or more field situations through the use of photographic slides and/or video tape. Such presentation could be made to an entire class at once with the students answering specific questions concerning the situation as a means of taking the examination. Our investigations showed that with the resources available to Golden West College, production of photographic slides or video tapes for use as described above was impractical.

As a more feasible alternative, a written final examination was prepared using the same conceptual logic as might be used in a video tape presentation. A specific situation was described, questions were asked of the student about the situation and the student's responses were evaluated to determine a test score. The examination prepared was tested thoroughly at the Los Angeles Police Academy before it was implemented and administered to the control and experimental groups. This examination appears in Appendix IV.

EVALUATION OF LEARNING MATERIALS

The learning materials, consisting of the syllabus and the simulated case problems, were evaluated using established statistical and experimental techniques. These procedures are thoroughly described in Section IV of this report.

III. OBJECTIVES OF PROJECT CALCOP

As reported in the Project CALCOP quarterly progress report of October 1, 1969, and as later refined, the general and behavioral objectives of the project are enumerated below.

GENERAL OBJECTIVES

1. Develop study materials in search and seizure to be used for recruit training in criminal investigation;

2. Develop computerized case problems which stem from (1) above and which reinforce learning, broaden perspectives, and provide simulated field experiences for those completing the search and seizure section of recruit training; and to

3. Evaluate the effectiveness of the learning materials developed in (1) and (2) above as compared with conventional classroom instruction in the same subject areas.

These general objectives serve the broader purposes of:

1. Preparing officers for field police work.

2. Preparing officers to apply basic rules of evidence to field situations involving criminal investigation.

BEHAVIORAL OBJECTIVES

After completing the segment of study prepared by Project CALCOP, police officers and police cadets should be able to perform the following tasks:

1. Recognize Evidence and Identify Types of Evidence

   Demonstration of the ability to perform this task will involve studying a field situation and selecting and identifying pertinent evidence related to the situation. Within ten minutes, students will correctly identify 80 percent of the pertinent items of evidence found in an actual situation as examined through the use of written case descriptions and/or audio-visual presentations.

2. Gather and Preserve Evidence

   a. Prepare Reports and Field Notes Demonstration of the ability to do this will involve studying field situations and identifying evidence to be included in specific report types. Within fifteen minutes students will examine a field situation and prepare reports required by the evidence on hand. The situation will be presented through the use of written case description and/or audio-visual presentation.

   b. Gather Testimony from Witnesses Demonstration of the ability to do this will involve identifying witnesses to a field situation who should be interviewed. Students will examine a field situation and within ten minutes must identify all witnesses who should be interviewed. The field situation will be presented through the use of written case descriptions and/or audio-visual presentation.

   c. Gather and Preserve Physical Evidence Demonstration of the ability to do this will involve identifying artifacts to be gathered from field situations as evidence and selecting means to collect and preserve them. Students will examine a field situation and list 85 percent of the items that should be gathered as evidence and will associate these with written descriptions of the means best used to gather and preserve them. This will be accomplished in twenty minutes. The field situation will be presented with written case descriptions and/or audio-visual presentation.

3. Exercise Evidence-Gathering Techniques that Assure the Admissibility of the Evidence in Court

Demonstration of the ability to perform this task will involve:

a. Distinguishing evidence from non-evidence in field situations.

b. Identifying evidence as found in field situations that will be inadmissible in court as opposed to that which will not be admissible.

The student will examine a field situation and list items of evidence as differentiated from non-evidence and will further categorize items of evidence into those that will be excluded as opposed from those that would not be excluded in a court of law. Eighty-five percent of the items in the situation must be correctly categorized within twenty minutes. The field situation will be presented using written case descriptions and/or audio-visual presentation.

MEETING THE OBJECTIVES

As originally articulated in the Project CALCOP proposal and in subsequent quarterly reports, the project's objectives pointed to considerably more elaborate learning systems than were feasible for development with the resources available to the District. For example rather than preparing elaborate tutorial interactive materials for computer-assisted study of cognant material in the area of search and seizure, the project found it more feasible to develop the study syllabus found in Appendix I. A syllabus was determined to be more flexible for student's use inasmuch as it could be used and studied virtually anywhere without requiring the student to use a computer terminal.

The specific behavioral objectives found in Section III of this report were particularly difficult to evaluate in terms of the time available for evaluation. There is little question that the syllabus and the simulated

case problems as learning strategies contribute to the police cadet's ability to recognize, identify, gather, and preserve evidence in a manner that assures admissibility of the evidence in court. Designing evaluation devices to measure the degree to which these objectives are served by the learning strategies is quite a difficult matter. The total amount of classroom time typically spent in the area of search and seizure seldom exceeds ten hours. Testing exercises sufficient to measure the behavioral objectives outlined in Section III of this report must necessarily be very comprehensive and very detailed in nature, involve considerable photographic representation of case situations and probably would be best impelmented through the use of a crime-site mock-up. Surrendering to the difficulties of preparing such evaluative instruments, we developed the examination appearing in Appendix IV as an approximation to the ideal expressed in the behavioral objectives. More about this important matter will be said in the conclusion of this report.

Despite the difficulties in preparing an evaluative technique that meets the aspirations of the expressed behavioral objectives of the project, evidence presented in Section IV of this report leads us to believe that these instructional techniques are more effective in meeting the objectives of course work in search and seizure than in conventional classroom techniques. The examination that has been employed does in fact present the police cadet with a case situation in which he must evaluate appropriate steps to take. His answers to the questions put to him by the examination are some indication of the degree to which he understands the appropriate procedures to use when actually in the field.

IV. EVALUATION OF THE LEARNING PROCEDURES

STATISTICAL PROCEDURES

Evaluation of the learning procedures designed as part of Project CALCOP followed conventional statistical procedure. We were interested in the null hypothesis that there would be no significant difference in performance levels between cadets at the Golden West Police Academy (the experimental group) and cadets at the Los Angeles Police Academy (the control group) as measured by the examination enactments shown in Appendix IV. Finding a statistically significant difference would give us cause to reject the null hypothesis, concluding that the CAI learning procedures were either more or less effective than the conventional procedures, depending upon the sign of the difference.

Comparison of performance scores between the control and experimental groups with respect to the CALCOP examination enactments as well as on the California Short Form Test of Mental Maturity and the Wonderlic Personnel Test made use of the t test for significant differences in mean scores[1] and the Wilcoxon matched pairs signed-rank test.[2]

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[1]Fergeson, G. A., Statistical Analysis in Psychology and Education, (New York: McGraw-Hill), pp. 167-174.

[2]Seigal, S., Non-Parametric Statistics for the Behavioral Sciences, (New York: McGraw-Hill), pp. 75-83.

In comparing mean performance scores we used one of two calculation procedures to arrive at t, depending upon the homoscedasticity of the test score distributions of the two groups being compared. For those cases in which the variances were homogeneious, we used the formula

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\Sigma(X_1 - \bar{X}_1)^2 + \Sigma(X_2 - \bar{X}_2)^2}{N_1 + N_2 - 2} \cdot \left(\frac{1}{N_1} + \frac{1}{N_2}\right)}}$$

Where X_1 is the individual score for members of Group 1, X_2 the individual scores of the members of Group 2, $\bar{X}_1$ and $\bar{X}_2$ the representative mean scores of Groups 1 and 2, N_1 the total number of students in Group 1, and N_2 the total number of students in Group 2.[3]

In those cases in which the variances of the two distributions the means of which were to be compared were not homogeneious, we used the formula

$$t^* = \frac{S_{\bar{x}_1}^2 t_1 + S_{\bar{x}_2}^2 t_2}{S_{\bar{x}_1}^2 + S_{\bar{x}_2}^2}$$

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[3]Freund, J. E., Modern Elementary Statistics, Third Edition, (Englewood Cliffs, New Jersey: Prentice Hall), p. 256.

Where t_1 is the critical value of t_i required for significance at the .05 level of confidence with N_1-1 degrees of freedom and t_2 the critical value of t_i required for significance at the .05 level of confidence with N_2-1 degrees of freedom and where

$$t_i = \frac{X_1 - X_2}{S_{\bar{x}_1 - \bar{x}_2}}$$

with i = 1,2 and where

$$S_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{\Sigma(X_1 - \bar{X}_1)^2}{N_1(N_1-1)} + \frac{\Sigma(X_2 - \bar{X}_2)^2}{N_2(N_2-1)}} = \sqrt{S_{\bar{x}_1}^2 + S_{\bar{x}_2}^2}$$

where the variables are as described above.[4]

We tested the score distributions on each of the tests administered for homogeniety of variance by considering the ratio of the two variances as calculated by

$$R = \frac{\frac{\Sigma(X - \bar{X}_1)^2}{N_1 - 1}}{\frac{\Sigma(X - \bar{X}_2)^2}{N_2 - 1}}$$

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[4]Fergeson, op. cit., pp. 171-172.

and consulting a table of the F distribution for R to determine whether or not the difference between the variances is significant.[5] In those cases in which the variances were not homogeneious, t^* was calculated, otherwise we found t. Hereafter in this report, tests of significant mean differences will be reported as significant in terms of t or t^* depending upon the homoscedasticity of the two distributions yielding the means.

Use of the t (or t^*) test for significance of mean differences requires, in addition to homogeneity of variance, that the distributions be normally distributed. Usually, with N = 30, normality may be assumed.[6] However, as our populations never exceeded 28 in number and on one occasion was only eight, we performed the Wilcoxon ranked-pairs test to verify that the significant differences we found with the t and the t^* tests also appeared significant under the weaker yet distribution-free non-parametric test. In every case, the Wilcoxon test yielded results that agreed with our t and t^* calculations.

Evaluation procedures and the results of statistical calculations are described in the paragraphs that follow.

EXAMINATION DEVELOPMENT

Inasmuch as the purpose of the evaluative phase of Project CALCOP was to measure the relative effectiveness of the computer assisted instruction techniques used with conventional classroom presentation techniques, a first important task of the project was to develop the final examination as appears in Appendix IV.

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[5] Ibid., pp. 181-183.

[6] Freund, op. cit., p. 255.

The examination was tested at the Los Angeles Police Academy. Groups of cadets at the Academy would take the examination. After scoring, the cadets and the instructor would critique the examination in terms of clarity and legal accuracy. After making appropriate modifications, the instructor would administer the examination to a fresh group of cadets and repeat the evaluation. In this manner, cadet reactions to and performance on the examination was carefully considered in subsequent revisions of the final examination. Revisions were retested as described above until the final draft of the examination as appearing in Appendix IV was completed.

The examination consists of four case enactments each of which provide the cadet with certain information regarding a particular case situation. In every case, the case situation presented by the examination was similar to a real life situation with names of persons and of places changed to prevent students, to every extent possible, from recognizing the situation as one that he may have studied earlier.

CONTROL AND EXPERIMENTAL GROUP SELECTION

The experimental group for this study consisted initially of twenty-seven police cadets enrolled in the Golden West College Police Academy during the Fall semester, 1970-71. This group undertook to study matters of search and seizure through independent use of the syllabus and through the use of the computer assisted instruction simulation exercises described earlier in this report.

The control group for the experiment consisted of police cadets at the Los Angeles Police Academy who undertook to study matters of search and seizure through conventional classroom instruction as conducted at that

Academy. Sixty police cadets out of a class of seventy-one at the Los Angeles Academy took the final examination enactments.

Members of both the control and the experimental groups took the California Short Form Test of Mental Maturity and the Wonderlic Personnel Test. Using the IQ scores achieved on the California Short Form Test of Mental Maturity for each of the twenty-seven members of the experimental group as a basis, twenty-seven members of the Los Angeles Police Academy group were selected so as to give twenty-seven matching pairs of cadets, one group each from the Golden West College Police Academy and from the Los Angeles Police Academy. Table I shows the initial populations of both the control group (Los Angeles Police Academy group) and the experimental group, (the Golden West College group) and the degree to which IQ scores differed as between two members of any one matched pair. The differences between the mean IQ scores of the twenty-seven members of the control group as compared to the twenty-seven members of the experimental group were evaluated through the use of the t distribution. This yielded a t score of 0.218 indicating no significant differences between the mean IQ scores between the control and the experimental groups.

After completing the training program and gathering performance data, there remained twenty-three matched Golden West - Los Angeles Academy pairs for whom complete data were available. These matched pairs and their respective California Short Form Test of Mental Maturity scores (IQ scores) appear in Table II.

Differences in IQ scores as shown in Table II between the Los Angeles Police Academy control group, Group 1, and the Golden West College experimental group, Group 2, were compared using two techniques. As described

earlier, the t test was performed to assess the differences between mean IQ's for the groups. This yielded a t score of -0.04. This score is not significantly different at the .05 level of confidence. We also performed the Wilcoxon matched pairs signed-rank test. This procedure yielded a T score of 43 with an N of 14 which demonstrated no significant differences between the matched pairs at the .05 level of confidence.

Table III shows the relative Wonderlic Personnel Test scores for both the Golden West College experimental group and the Los Angeles Police Academy group. We performed the same tests on the Wonderlic score differences as we performed for the California Short Form Test of Mental Maturity scores. The t test for significant differences between mean Wonderlic scores yielded a t of 0.8 which showed that there was no significant difference between the mean Wonderlic scores between the control and experimental groups. The Wilcoxon matched pairs test yielded a T of 83 for an N of 19, again showing no significant difference at the .05 level of confidence.

We were also interested in the degree to which the Los Angeles Police Academy control group, consisting of twenty-three selected members, represented the total seventy-one members of the Los Angeles Police Academy from whom the control group was drawn. The t test for differences in mean IQ scores yielded a t of -1.4 which was not significant (.05 level). Similarly, the t test was used to measure differences in mean scores on the Wonderlic examination between the twenty-three members of the Los Angeles control group and the total seventy-one member Los Angeles Academy group that took the test. In this case, the t score was -1.7, again not significant at the .05 level of confidence.

We also compared the Golden West College experimental group with the total seventy-one member Los Angeles group. The t test in this case yielded a t score of -1.43 which was not significant at the .05 level for mean IQ scores. Similarly, the t score for the differences in mean Wonderlic scores was -0.83, again not significant at the .05 level of confidence.

As a result of these calculations and comparisons we can make the following observations:

1. There is no significant difference in mean IQ scores as measured by the California Short Form Test of Mental Maturity between the twenty-three member experimental group at Golden West College and the twenty-three member control group at the Los Angeles Police Academy.

2. There is no significant difference in mean Wonderlic Personnel Test scores between the control group and the experimental group.

3. The control group of Los Angeles Police Academy cadets is a representative sample in terms of IQ and Wonderlic scores of the total seventy-one member group of Los Angeles Police Academy cadets.

4. There is no significant difference in either mean IQ scores or in mean Wonderlic scores between the Golden West College experimental group and the total group of Los Angeles Police Academy cadets.

Accordingly, any differences to be found between performance levels on the examination enactments as between Group 1 and Group 2 cannot be attributed to differences in intellectual ability as measured by the California Short Form Test of Mental Maturity and the Wonderlic Personnel Test. Differences in performance levels on the final examination must be accounted for by other factors than differences in measured ability.

TRAINING

Police cadets at the Los Angeles Police Academy studied materials relating to proper procedures in search and seizure matters under conventional

classroom instruction. This instruction consisted of lectures and classroom discussions. As described earlier in this report, police cadets at the Golden West College Police Academy studied the same materials making use of the study syllabus and the computer assisted simulated case problems. This group received no classroom instruction.

EXAMINING

After completing the training program in search and seizure, cadets at both the Police Academy in Los Angeles and the Academy at Golden West College completed a written examination consisting of four case problems or enactments in which the student was asked specific questions about procedures and matters of fact relating to the situation described. The examination appears in Appendix IV.

All of the examinations were scored by Derald Hunt, the Coordinator of the Law Enforcement program at Golden West College. Scoring was done by one individual to minimize to every extent possible differences in scoring procedures that might arise should more than one person score the tests. Of the four enactments included in the final examination, only three were scored for the Los Angeles Police Academy group. This is so because the fourth enactment was returned to the students and was therefore unavailable for scoring at the same time that the other three enactments were available. For this reason, only the first three enactments of the final examination have been used in this study to measure differences in performance levels between the Los Angeles Police Academy group and the police Academy at Golden West College.

RESULTS

Tables IV, V, and VI show the relative examination scores for enactments 1, 2, and 3, respectively. Maximum score possible for enactment 1 was 11. Maximum score possible for enactment 2 was 9, and for enactment 3, a maximum score of 10 was possible. Table VII shows the total scores on all three enactments for each of the control - experimental matched pairs.

Both the t test and the Wilcoxon matched pairs signed-rank tests were applied to the performance scores on the examination enactment. Table VIII lists the results of these calculations. In every case, cadets at the Golden West College Police Academy performed better on the final examination than did cadets at the Los Angeles Police Academy and in every case the difference in performance levels was statistically significant at the .05 level of confidence. For enactment 1 Golden West College cadets averaged 2.17 points higher in performance scores than did their counterparts at Los Angeles. For enactment 2 the difference in mean performance level was 1.52 points higher. Similarly, for enactment 3 Golden West College cadets averaged 1.96 points higher than did the Los Angeles Police Academy cadets. For the three enactments taken together the Golden West College group averaged 5.65 points higher in performance scores than did the group at the Los Angeles Police Academy.

V. CONCLUSIONS

The most obvious conclusion to be drawn from the procedures outlined above says that the learning procedures followed at Golden West College in the area of search and seizure were more effective than were the procedures followed at the Los Angeles Police Academy, at least as measured by the final examination enactments appearing in Appendix IV of this report. Testing and selection of the experimental and control group minimized differences in performance level that might arise as a result of differences in abilities between the two groups. Selection procedures exercised by the Los Angeles Police Academy and the several police agencies employing the Golden West College cadets probably minimized differences in educational level, reading skills and writing skills that would not also appear as differences in IQ and Wonderlic scores. There remains then the difference in training procedures between the two groups as a factor which would account for the differences in performance levels.

The control group at the Los Angeles Police Academy undertook training in the area of search and seizure with conventional classroom instruction under rigid circumstances in which the learning situation was rather well structured. Instructors at the Los Angeles Academy lectured to the cadets,

described to them specific case situations, and elicited responses from members of the class as to what they would do or what should be done in a particular case situation. Cadets at the Golden West Police Academy program had no such classroom instruction and limited their efforts to studying the syllabus and answering questions put to them about specific case situations by a computer terminal. We assert, and our conclusions here are based upon the statistics reported above, that this basic difference in instructional approach accounts for the differences we find in performance levels between the Los Angeles Police Academy control group and the Golden West College Academy experimental group.

As we analyzed our data, however, we became interested in other phenomena that might partially account for some of the observed performance differences. Experimental bias, for example, is a common place failing in most experimental studies of this kind and there is some likelihood that it may have played a part in increasing the performance level of the experimental group. The experimental group and the control group were widely separated geographically and enjoyed no inter-group communication whatsoever. Nevertheless the group at Golden West College did know that their performance levels on an examination covering the areas of search and seizure would be compared with scores on the same examination earned by Los Angeles Police Academy cadets. This knowledge may have motivated the group to apply themselves more assiduously to their studies and, to the extent that they did, the experiment was biased. However, we should point out that most classroom teachers turn to a number of devices and strategies to motivate students to study harder and whether or not the devices and strategies employed by the

Los Angeles Police Academy instructors in this area were more or less effective as motivators than the knowledge on the part of Golden West College cadets that their performance was to be compared with another group, is a matter of conjecture.

A second phenomenon which might play an even more important part in explaining differences in performance levels between the two groups had to do with the experimental group at Golden West College learning how to take the final examination. The case problem approach as employed through the computer assisted simulations presented materials and questions about the facts of cases in almost exactly the same manner as is found in the examination itself. Thus students studying the syllabus and then answering questions about specific case situations as posed by the computer terminal were in effect taking an examination not at all unlike the one they would take as a final measure of their achievement. In this way, they were learning how to take this type of examination. Cadets at the Los Angeles Police Academy, on the other hand, had no similar training experience. Their exposure to the presentation of case situation facts and then answering questions about the situation was probably a new one for them. To examine the degree to which this might be true, we compare the control group performance on a multiple choice examination covering the area of search and seizure and rules of evidence with the performance of a preceding class on the same examination.

At the completion of the Police Academy at Golden West College, all cadets took a multiple-choice final examination covering all phases of the Academy program. The experimental group in this study took this examination as did the Academy class that immediately preceded them. The examination consisted of a number of separate parts, three of which contained no test items

dealing with matters of search and seizure and rules of evidence. The remaining parts contained, among other things, twenty-five questions concerning search and seizure and rules of evidence. Being interested in the degree to which cadets in our experimental group at Golden West College did better or worse than did their predecessor class, we examined their relative performance on the multiple choice final examination for the complete academy. The results of our analysis appear in Table IX. This table presents the mean percentage scores earned on each of the three portions of the test that included no test items dealing with search and seizure, and rules of evidence as well as for the three sections taken together, and those twenty-five test items that deal exclusively with search and seizure and rules of evidence. Our comparison of mean scores followed the procedures discussed earlier and the resulting t (or t^*) scores also appear on the table.

Of the five mean differences in exam scores shown in Table IX, only the mean differences on the twenty-five questions dealing with search and seizure and rules of evidence is statistically significant (.01 level). Our control group, then, did significantly better than their predecessors on the search and seizure and rules of evidence portion of their final exam but performed only equally as well on those protions of the final examination that dealt with other matters.

Reconsider the argument that the experimental group performed better on the examination appearing in Appendix IV as a result of having learned how to take this type of examination more effectively than the control group. This may be true. However, they also learned, apparently, how to take multiple choice examinations better than their predecessors, but only with

respect to questions dealing with search and seizure and rules of evidence. The data appearing in Table IX lead us to discount heavily the argument that performance differences we found between the control and the experimental groups can be largely explained away as the result of having learned how to take a particular type of examination.

A third phenomenon that could explain performance differences between the control and experimental groups has to do with the degree of experience as operating police officers that cadets may have had prior to entering the police academy. Several cadets at Golden West College had previous experience as police officers before enrolling. Only one of the cadets at the Los Angeles Police Academy had any experience before entering his training program. In an effort to isolate the effect which previous experience may have had upon differences in mean performance levels between the two groups, we eliminated all those matched pairs in which the Golden West College member had had more than a few days prior experience. The remaining matched pairs, their respective IQ and Wonderlic scores, as well as their performance scores on each of the three examinations enactments and for the total examination appear in Table X. Both the T test and the Wilcoxon matched pairs ranking test for this non-experienced sub-group showed that there were no significant differences at the .05 level of confidence between the Los Angeles and the Golden West groups with respect to either the IQ scores or the Wonderlic scores. As with the large group analysis, Golden West College cadets performed consistently better on all three enactments and for the total examination than did the Los Angeles cadets. In every case the increased performance was statistically significant at the .01 level of confidence. On enactment 1

Golden West College cadets earned an average of 2 points higher than did the Los Angeles group. This mean difference was 1.7 points higher for the second enactment and 1.9 points higher for the third. With respect to the examination taken as a whole, Golden West College cadets performed better than did the Los Angeles cadets by a mean difference of 6.2 points.

This examination of the non-experienced cadet pairs leads us to conclude that the experience enjoyed on the part of some of the Golden West college police cadets played no significant role in accounting for the overall increased performance levels of the entire twenty-three man experimental group.

An even more important factor that might well explain the performance differences we found may be that of removing the police cadet from the classroom. Typically, classroom learning situations in police academies is much more rigorous and much more structured than typical classroom situations found in other college areas. Discipline is more rigidly enforced and students may feel less free to investigate areas of interest to them than do students in such areas as say philosophy, literature, or even mathematics and physics. In this respect, police academy classrooms resemble military basic training camps. As a result, police academy programs may be criticized as being non-condusive to learning. Developing learning situations for specific skills and specific areas of conceptual knowledge in law enforcement and removing students from a rigidly disciplined classroom envirommenf while they study these subjects may well prove to be more effective than current methods.

Although we are not prepared on the basis of Project CALCOP to conclude that the computer assisted learning portion of the learning system devised is more effective than classroom instruction, we do think that the total

learning system including independent study of the syllabus as well as computer assisted case problems, presents a more effective learning environment in the area of search and seizure than does conventional classroom instruction. This is not to say, of course, that conventional classroom instruction has been other than excellent in quality. In fact we cannot say, as a result of this study, that it has been good, bad, or indifferent. Rather, we have found evidence that instructional effectiveness in search and seizure can be further improved through the use of learning systems similar to that developed by Project CALCOP.

VI. RECOMMENDATIONS

We have never seen a research report that does not close with recommendations for additional research. This one will not conclude differently. It is clear to us from the work we have done so far that independent study and computer assisted learning techniques can play a most important role in the training of police officers. What is needed most at the present time are better examination procedures that more adequately assess the ability of police officers to perform in the field. The written examination used as part of Project CALCOP may not serve adequately at all as compared to a more realistic evaluation procedure in which police officers investigate a mock-up crime situation. The first step, then, in continuing the type of study started with Project CALCOP is to engineer such evaluation devices and validate them as appropriate measures of operating skills on the part of active police officers.

Other experimentation with computer assisted learning as well as that undertaken with Project CALCOP has led us to believe that the typewriter terminal is an inadequate device for computer assisted learning. It would be much better, we think, to present written, photographic, or other graphical information to students in the form of visual display. This cannot be done at

the present time through the use of typewriter terminals such as those employed in Project CALCOP. Under investigation at this time by the Coast Community College District is the use of random access microfiche display units under the control of a computer. Combining the materials we have already prepared for Project CALCOP with microfiche display techniques, we think that we could substantially improve the learning system devised. Rather than read a written description of a case situation, students would instead study photographic images portraying the particular situation. In such a system the student would still enjoy the individualized attention that he currently receives from the computer terminal, however, he does not have to wait for the typewriter terminal to finish typing out a message before he can respond to it. Written messages as well as photographic information can be displayed on an illuminated screen within a few seconds access time while the student continues to enter his answers into a computer typewriter terminal. Experimental work with this system is just beginning and we think that Project CALCOP has played a significant role in pointing us in this direction.

Officials at the Golden West College Police Academy are interested in pursuing the learning strategies employed in Project CALCOP in other areas of police training. This too is an important area for continued study and research. An earlier study completed by the Coast Community College District found CAI to be equally effective as classroom instruction, but no better.[7] We harbor strong suspicions that learning systems that remove the police cadet from the disciplinary atmosphere of the Academy classroom may alone be

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[7] Computer Assisted Learning to Teach Computer Operations, Unpublished research report, November, 1970.

more effective than current techniques. We need to answer two questions in this regard. First, to what extent can the performance differences found by Project CALCOP be explained by the CAI system as opposed to simply removing the student from the classroom for self-study? Second, is self-study in general (whether or not computer-assisted) a more effective instructional stragety for police training than current classroom techniques?